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ABSTRACT

This syllabus, which is the second of a two-volume set describing the basic competencies needed by entry-level workers in the field of electronics, deals with the competencies needed in five different electrical occupations. Competencies are organized according to the following occupational areas: electronic assembly, telephone repair and installation, security alarm installation, videocassette recorder repair and maintenance, and cable television installation. A chapter on general electrical safety competencies is also provided. Each page in the syllabus presents a competency statement that is defined by an indicator, a performance objective, a benchmark, and one or more specific observable tasks or behaviors to be used as more assessment criteria. (MN)

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Jobs Training Partnership Act

# EMPLOYABILITY COMPETENCIES

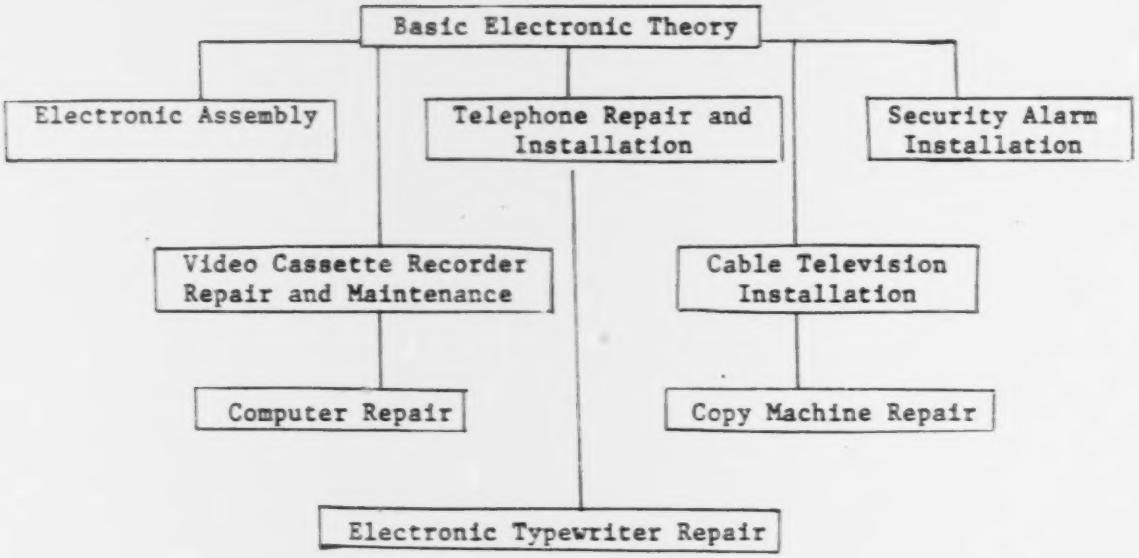
# FOR

# ENTRY LEVEL

# OCCUPATIONS IN ELECTRONICS

# PART TWO:

## JOB SPECIFIC SKILLS




LOS ANGELES UNIFIED SCHOOL DISTRICT

Division of Adult and Occupational Education

Intsructional Services Unit

MANPOWER PROGRAMS

August 1, 1985



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## PREFACE

Electronic Occupations - A Competency-Based Program

Competencies for Electronic Occupations are presented in two main groups: (1) Basic Electronic Theory, and (2) Job Specific Skills.

Part One, Basic Electronic Theory, is a syllabus which represents the "core" competencies which students learn in all of the electronic occupational classes. Each page in the syllabus presents a competency statement which is defined by an "indicator", a performance objective, a "benchmark", a specific observable behavior or task, and finally, the "assessment", which describes the criteria for successful completion of each task. Attainment of basic electronic theory competencies are documented by written examinations.

The basic electronic theory competencies have been identified by a consensus opinion of instructional staff who mutually agreed to the elements of the core program. The appendix to Part One includes a series of vocabulary tests, designed to enhance learning of electronic concepts. The program can easily be adapted to a bilingual learning model because each unit is written to clearly present both what is desired in conceptual learning, and the related job performance objectives.

Job specific competencies are identified in Part Two and Part Three as follows:

Part Two: Job Safety
Electronic Assembly/Test Technician
Telephone Installation and Repair
Security Alarm Installation and Repair
Cable Television Installation
Video Cassette Recorder Repair

Part Three: Computer Repair
Copy Machine Repair
Electronic Typewriter Repair

Having taken into consideration employer input, instructors identified job specific competencies. Competency statements have been submitted by instructors for presentation under each job title. Documentation of job specific competencies will be accomplished by written examination or product produced.

Thus, the competency-based electronics program is a combination of basic theory with a job specific application. The competency syllabus provides each instructor with guidelines to develop their instructional program, so that, participants can be assured that completion of the program will result in the attainment of skills that will enable students to obtain training related employment. In addition, all of our competencies have been reviewed and validated by industry representatives.

It must be noted, that certain aspects of electronics will be taught in relation to the individual participant needs and potential for job placement. Advanced mathematics is one such topic. Math may not be required by all students to the same degree. Thus, although math is not over-looked, it is not shown herein as a basic competency. When pre-employment testing, or a particular job, requires mathematics, participants will receive instruction to assure the student is fully prepared.

Another area that is not shown in the basic competencies is the use of oscilloscopes and microscopes as related to electronic construction skills and electronic testing. When an instructor is preparing students

for a specific employer who requests workers with these abilities, students will receive training in the use of these items.

The integration of the material into course curriculums is dependent on the agency providing JTPA training services. Selection of competencies must be based on participant need and compatibility with the targeted occupation. The identification of Electronic Competencies does not attempt to provide input in regards to teaching methodology. The statements present a consensus opinion of optimum skill level for youth entering the work force in the field of entry level electronics.

ACKNOWLEDGEMENTS

Appreciation is extended to the Los Angeles Unified School District's Skills Center electronic occupations instructors, Bob Wilhelm, Anthony Fernandez, Robert Macias, Paul Rodriguez, Kook Lee, Bao Nguyen, Gracie Brown, Ganzia Washington, and Larry Gow for their participation in the identification of occupational competencies. The text has been developed and written by Claire Werner as part of the school district's contract with the City and County of Los Angeles and the State Department of Education.

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# GENERAL ELECTRONIC SAFETY PROCEDURES

COMPETENCY AREA: ELECTRONICS - GENERAL OCCUPATIONAL

COMPETENCY STATEMENT: The trainee has a basic understanding of principles and concepts of electricity as applied to electronic vocational skills.

INDICATOR: The trainee demonstrates knowledge of safety procedures commonly used in the electronics industry.

BENCHMARK: The trainee observes safety procedures when working in the electronic laboratory.

ASSESSMENT: The trainee demonstrates his/her knowledge of safety procedures by correctly completing a safety test with no less than 95% accuracy.

While working with electronic equipment, the trainee observes the following precautions:

1. Does not overload electrical circuits. Protects all circuits by fuses or circuit breakers to avoid fire.

2. Reports to the teacher when a circuit breaker opens or a fuse blows as a result of an overload. Corrects the fault before turning the power back on.

3. Only makes changes in the wiring of any circuit after the power has been shut off or the equipment has been unplugged.

4. Properly grounds frames and housings of all protable electrical equipment.

5. Does not allow wires to cross the aisle unless the teacher has approved the set-up.

6. When making temporary or permanent connections, avoids leaving open splices or pieces of wire sticking out. Secures all wires properly. Tapes or covers the connections.

7. Disconnects the power source before replacing a fuse in any electrical equipment.

8. Is careful not to let component leads hit anyone when cutting component leads.

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COMPETENCY AREA: ELECTRONICS - GENERAL OCCUPATIONAL

COMPETENCY STATEMENT: The trainee has a basic understanding of principles and concepts of electricity as applied to electronic vocational skills.

INDICATOR: The trainee demonstrates knowledge of safety procedures commonly used in the electronics industry.

BENCHMARK: The trainee observes safety procedures when working in the electronic laboratory.

ASSESSMENT: SAFETY (continued)

9. Is careful in handling component leads after trimming, realizes the cut ends are sharp.

10. Takes care when using a knife to remove the insulation from wires.

11. Always uses a test lamp or other meter for testing purposes.

12. Considers all electric wires "live" until they have been proven otherwise.

13. Handles all live wires carefully. Realizes low voltage wire can give serious burns and high voltages a fatal shock.

14. Under no circumstances does the trainee give another person an electric shock.

15. The chasses of an AC-DC radio are kept clear of ground wires and all other conductors, such as, metal table tops.

16. When making adjustments on an AC-DC radio, when the power is on, avoids coming in contact with metallic and grounded objects.

17. Makes sure that any capacitor has been discharged before touching its terminals or connections.

18. Before touching anything behind the panel of any electrical equipment, removes the attachment plug from the wall outlet to insure that all power circuits are off.

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COMPETENCY AREA: ELECTRONICS - GENERAL OCCUPATIONAL

COMPETENCY STATEMENT: The trainee has a basic understanding of principles and concepts of electricity as applied to electronic vocational skills.

INDICATOR: The trainee demonstrates knowledge of safety procedures commonly used in the electronics industry.

BENCHMARK: The trainee observes safety procedures when working in the electronic laboratory.

ASSESSMENT: SAFETY (continued)

19. Never allows anyone to switch power on and off for him/her while working on electrical equipment.

20. Removes headphones while working on transmitters or receivers.

21. Keeps one hand behind back or in pocket when testing high-voltage circuits.

22. Grounds shielding around transmitting equipment.

23. Does not draw a test from transmitters and TV power supplies.

24. Avoids bodily contact with high-voltage power supplies.

25. Does not touch a hot vacuum tube, resistor, or freshly made solder joint. Allows cooling time before gripping them.

26. Realizes cathode-ray tubes (such as TV picture tubes) are dangerous because they can explode and injure a person with flying glass.

27. Is very careful when handling broken glass from picture tubes and flourescent light bulbs because the chemicals contained in them are very dangerous.

28. Avoids touching the metal prongs of electrical plugs.

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COMPETENCY AREA: ELECTRONICS - GENERAL OCCUPATIONAL

COMPETENCY STATEMENT: The trainee has a basic understanding of principles and concepts of electricity as applied to electronic vocational skills.

INDICATOR: The trainee demonstrates knowledge of safety procedures commonly used in the electronics industry.

BENCHMARK: The trainee observes safety procedures when working in the electronic laboratory.

ASSESSMENT: SAFETY (continued)

29. Does not stand on a wet floor when working with electricity. When possible may wear rubber-soled shoes. When necessary will wear gloves when doing certain types of electrical work.

30. Is careful when handling a device with a short circuit.

31. Realizes anything over 40 volts can be felt.

32. Makes sure fuses are the right size for a circuit. Does not replace a screw-in type fuse with a piece of wire or a penny.

33. Properly uses a ladder by carrying the ladder using arms and shoulders, lifts ladder using arms and legs correctly, and always secures the ladder to the truck by tying it down.

34. Follows safe procedures when climbing into attics and basements by walking on rafters and avoiding unsupported joists. The trainee carries a flashlight when working in dark places, and does not use a flame in the attic or basement.

35. Realizes that rods in soldering are toxic, avoids inhaling fumes from solder.

Instructor indicates student observes correct safety procedures appropriate to the projects he/she is working on and required by the occupational training program.

OCCUPATION: ELECTRONIC ASSEMBLY/TEST TECHNICIAN

COMPETENCY AREA: ELECTRONICS - ASSEMBLER/TEST TECHNICIAN

COMPETENCY STATEMENT: The trainee has a basic understanding of principles and concepts of electricity as applied to electronic assembly.

INDICATOR: The trainee demonstrates basic electrical construction skills commonly used in electronic assembly work.

BENCHMARK: The trainee identifies, names, and describes the use of common tools used in electronic assembly.

ASSESSMENT: Given pictures or actual tools, the trainee identifies, names, and describes the function of the following tools:

1. Diagonal cutting pliers - used for cutting small-diameter wires.
2. Long-nose pliers - used to grip, shape, or twist wires, and to hold the ends of components.
3. Slip-joint pliers - the slip adjust opening in these pliers enables them to grasp objects of various sizes. Can be used for holding different sizes of nuts and bolts, and also used to cut wire.
4. Side cutter pliers - can cut wires of larger diameter than wires cut by the long-nose pliers. Also used to grip objects or hold nuts while they are being adjusted.
5. Wire stripper/cutter - used to strip the insulation from the ends of wires to be connected in a circuit. It will also cut wire.
6. Screwdrivers - used to turn screws. Two major types are the straight-slot and the phillips head.
7. Allen wrenches - are shafts of metal designed to slip into special screws.
8. Nut driver - used to hold a nut while the screw threads are started and until the screw is fully tightened.

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COMPETENCY AREA: ELECTRONICS - ASSEMBLER/TEST TECHNICIAN

COMPETENCY STATEMENT: The trainee has a basic understanding of principles and concepts of electricity as applied to electronic assembly.

INDICATOR: The trainee demonstrates basic electrical construction skills commonly used in electronic assembly work.

BENCHMARK: The trainee identifies, names, and describes the use of common tools used in electronic assembly.

ASSESSMENT: COMMON TOOLS (continued)

9. Scratch awl - the end of the awl has a sharp point used to mark metal. The scratch marks are usually made to indicate places where metal is to be cut, bent, or drilled.

10. Chassis punches - devices designed to cut square or oval shapes in sheet metal. First a hole is drilled in the metal for a screw. The cutter bit and the mold are attached and the screw is tightened. As it is tightened, the punch cuts a hole through the metal.

11. Soldering Iron - tool used to melt solder and apply heat.

12. Vise - holds circuit board.

13. Portable Desoldering Tool - used to remove solder from P.C. Board.

COMPETENCY AREA: ELECTRONICS - ASSEMBLER/TEST TECHNICIAN

COMPETENCY STATEMENT: The trainee has a basic understanding of principles and concepts of electricity as applied to electronic assembly.

INDICATOR: The trainee demonstrates basic electrical construction skills commonly used in electronic assembly work.

BENCHMARK: The trainee states the three reasons for soldering electrical joints.

ASSESSMENT: The trainee states:

Solder is intended to provide:

1. Good electrical contact.
2. Prevent corrosion at the joint.
3. Add strength to the joint or splice.

COMPETENCY AREA: ELECTRONICS - ASSEMBLER/TEST TECHNICIAN

COMPETENCY STATEMENT: The trainee has a basic understanding of principles and concepts of electricity as applied to electronic assembly.

INDICATOR: The trainee demonstrates basic electrical construction skills commonly used in electronic assembly work.

BENCHMARK: The trainee explains the meaning of the term "solder" and names the materials used in solder.

ASSESSMENT: The trainee provides the following minimum information:

1. "Soldering" is the process of joining two pieces of metal using a third metal.

2. Solder is an alloy of tin and lead.

COMPETENCY AREA: ELECTRONICS - ASSEMBLER/TEST TECHNICIAN

COMPETENCY STATEMENT: The trainee has a basic understanding of principles and concepts of electricity as applied to electronic assembly.

INDICATOR: The trainee demonstrates basic electrical construction skills commonly used in electronic assembly work.

BENCHMARK: The trainee names and describes three types of electrical soldering.

ASSESSMENT: The trainee provides the following minimum information:

1. Contact soldering - is done using a soldering iron or soldering pencil. Each unit has a power supply that controls heat generated or available at the tip.

2. Dip soldering - is used in mass production of printed circuit boards. The leads of the connecting wires and components protrude from the back of the board. Flux is applied to them with a brush or spray. Then the board is lowered into a pot of molten solder. The solder cools when the board has been removed from the pot.

3. Wave soldering - similar to dip soldering, boards are prepared with all the components in place. The boards are then carried across a molten stream of solder. A machine causes a wave of solder to rise and touch the bottom of the board. Most of the printed circuit board has an organic coating, green in color, that prevents solder from being picked up by the copper strips on the board. Only the places where the leads come out are covered with solder. They are then cooled and checked for good connections.

COMPETENCY AREA: ELECTRONICS - ASSEMBLER/TEST TECHNICIAN

COMPETENCY STATEMENT: The trainee has a basic understanding of principles and concepts of electricity as applied to electronic assembly.

INDICATOR: The trainee demonstrates basic electrical construction skills commonly used in electronic assembly work.

BENCHMARK: The trainee explains "flux" as it is used in soldering electronic components.

ASSESSMENT: The trainee provides the following minimum information:

Solder is formed into a wire that contains a material called "flux". The flux prevents oxidation to ensure proper bonding between the solder and the joint. As the wire is heated the flux is released. In electronics work, the flux is "rosin".

COMPETENCY AREA: ELECTRONICS - ASSEMBLER/TEST TECHNICIAN

COMPETENCY STATEMENT: The trainee has a basic understanding of principles and concepts of electricity as applied to electronic assembly.

INDICATOR: The trainee demonstrates basic electrical construction skills commonly used in electronic assembly work.

BENCHMARK: The trainee provides a reason for desoldering, names three techniques of desoldering, and briefly explains each technique.

ASSESSMENT: The trainee provides the following minimum information:

1. Repair and upgrading of circuits often require removal or replacement of components.

2. The three basic techniques for desoldering are:

   a. The solder wick - is a braided wire that absorbs hot solder. The connection to be desoldered is heated with a soldering iron or pencil. Then the solder wick is placed in contact with the connection. The wick absorbs the hot solder, and when the wick is withdrawn, the solder is removed.

   b. The solder sucker - is a device which is a squeeze-type bulb. The connection to be desoldered is heated. The bulb is squeezed and then released at the connection to suck up the hot solder.

   c. The desoldering iron - is a specialized tool for desoldering. It includes both a suction device and a solding iron. The tip of the desoldering iron is placed at the connection. As the solder is heated, it is drawn off by the suction device.

COMPETENCY AREA: ELECTRONICS - ASSEMBLER/TEST TECHNICIAN

COMPETENCY STATEMENT: The trainee has a basic understanding of principles and concepts of electricity as applied to electronic assembly.

INDICATOR: The trainee demonstrates basic electrical construction skills commonly used in electronic assembly work.

BENCHMARK: The trainee applies correct technique when soldering as demonstrated by completing no less than three projects which require soldering electrical joints.

ASSESSMENT: The trainee proceeds as follows:

1. Cleans the soldering tip by removing the copper tip from the iron before filing. Files the tip so that the four sides of the copper are smooth and come together to a point.

2. Tins the tip by heating the tip and applying a thin coat of rosin core solder.

3. Uses rosin core solder for all electrical connections.

4. Checks to make sure that all parts to be soldered are clean. Scrapes lugs, wires, and other parts to be soldered with a knife until the metal appears bright.

5. Makes a good mechanical connection by wrapping wires around terminals or securely clamping them. When the wire is secured and tight the solder is applied.

6. Heats the connection by holding the hot iron tip against the parts to be joined until they are heated. Enough heat is applied so that the solder melts when it touches the wires being joined together.

7. Keeps the connection from moving while the joint is being soldered and while the solder is cooling.

8. Uses the proper amount of solder to complete the job. Realizes excessive solder does not help the connection, and may cause a short circuit.

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COMPETENCY AREA: ELECTRONICS - ASSEMBLER/TEST TECHNICIAN

COMPETENCY STATEMENT: The trainee has a basic understanding of principles and concepts of electricity as applied to electronic assembly.

INDICATOR: The trainee demonstrates basic electrical construction skills commonly used in electronic assembly work.

BENCHMARK: The trainee follows correct procedure when soldering as demonstrated by completing no less than three projects which require soldering electrical joints.

ASSESSMENT: SOLDERING (continued)

9. Protects certain parts from heat, such as diodes and transistors, by gripping the leads with pliers. Uses the pliers to conduct the heat away from the part.
10. When soldering in small spaces, uses a small tip.
11. The tip does not maintain contact with the board for more than three seconds.
12. Holds the tip steady when soldering.
13. Cleans the soldering tip immediately after use.

Instructor indicates correct soldering procedure has been followed.

COMPETENCY AREA: ELECTRONICS - ASSEMBLER/TEST TECHNICIAN

COMPETENCY STATEMENT: The trainee has a basic understanding of principles and concepts of electricity as applied to electronic assembly.

INDICATOR: The trainee demonstrates a fundamental understanding of terms commonly used in the field of electronic assembly.

BENCHMARK: The trainee completes vocabulary quiz #12 with no less than 80% accuracy.

ASSESSMENT: The trainee matches the following terms with the correct definition by writing the correct word next to the appropriate definition as follows:

1. Low wattage soldering iron. Soldering pencil
2. Circuit diagram. Schematic
3. Cuts holes in sheet metal. Chassis punch
4. Used for plumbing and metal. Acid-core solder
5. Absorbs hot solder. Desoldering iron
6. Used to mark metal. Scratch awl
7. Used to wrap wire around a peg. Wire-wrap gun
8. Used to pick up hot solder in a squeeze bulb. Solder sucker
9. Used to cut small-diameter wires. Long-nosed pliers.
10. To coat the tip of an iron with solder. Timming
11. Used to prevent oxidation at a joint and add mechanical strength. Soldering
12. Best of solder alloys. 60/40 solder
13. Coats printed circuit board when moved through a stream of solder. Wave soldering
14. Special type of wrench. Allen wrench

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COMPETENCY AREA: ELECTRONICS - ASSEMBLER/TEST TECHNICIAN

COMPETENCY STATEMENT: The trainee has a basic understanding of principles and concepts of electricity as applied to electronic assembly.

INDICATOR: The trainee demonstrates a fundamental understanding of terms commonly used in the field of electronic assembly.

BENCHMARK: The trainee completes vocabulary quiz #12 with no less than 80% accuracy.

ASSESSMENT: QUIZ 12 (continued)

15. Holds nut while screw is being turned or tightened. Nut driver
16. Used to grasp and twist wires. Side cutter pliers
17. Coats leads when circuit board is lowered into solder. Dip soldering
18. Removes solder. Desoldering iron.
19. Prevents oxidation during soldering. Flux
20. Device used to solder. Soldering iron
21. Cuts heavy wires. Side-cutter pliers
22. Grips large objects; adjustable. Slip-joint pliers

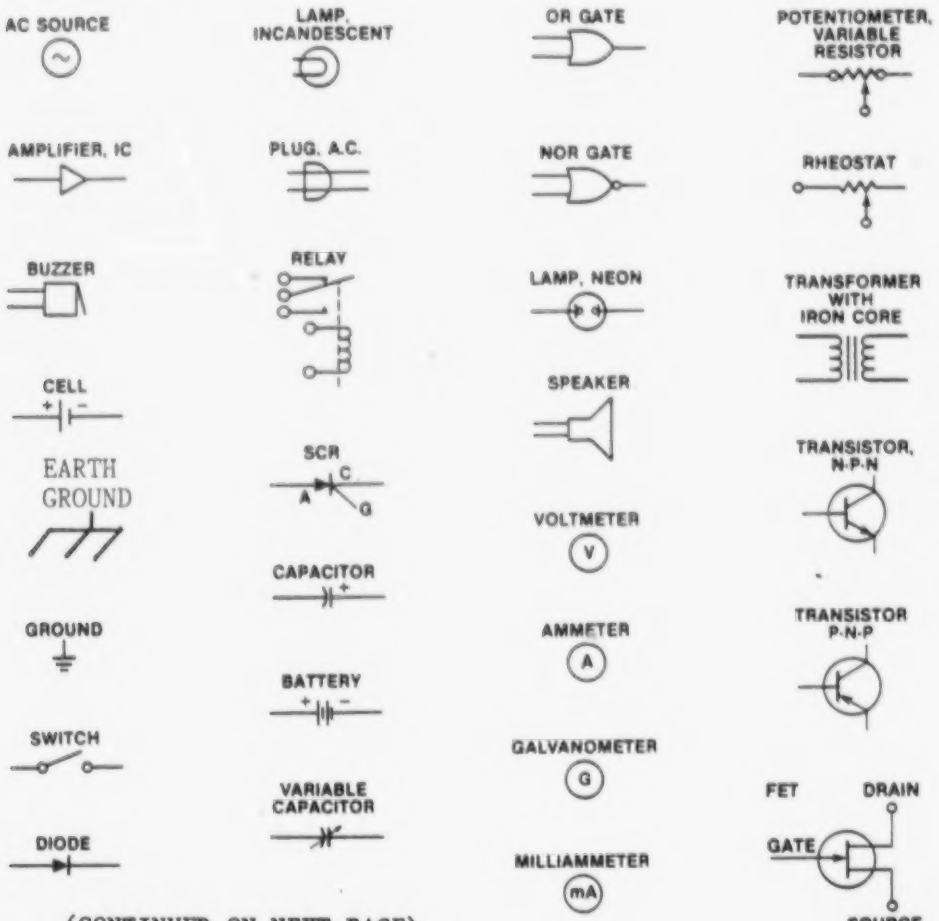
COMPETENCY AREA: ELECTRONICS - ASSEMBLER/TEST TECHNICIAN

COMPETENCY STATEMENT: The trainee has a basic understanding of principles and concepts of electricity as applied to electronic assembly.

INDICATOR: The trainee demonstrates knowledge of electronic symbols.

BENCHMARK: The trainee identifies and names common electrical symbols used in schematics.

ASSESSMENT: Given a quiz on electrical symbols, the trainee matches the symbol to the correct term by writing the correct term next to the symbol. The following symbols will be identified with no less than 70% accuracy.

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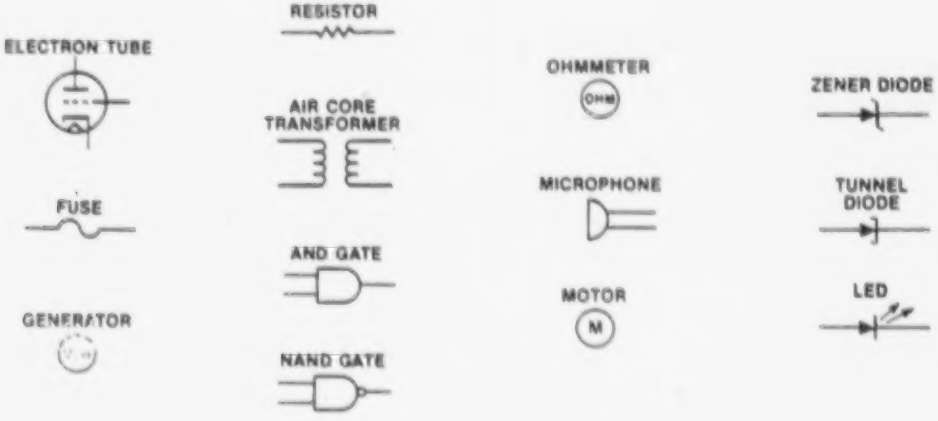
COMPETENCY AREA: ELECTRONICS - ASSEMBLER/TEST TECHNICIAN

COMPETENCY STATEMENT: The trainee has a basic understanding of principles and concepts of electricity as applied to electronic assembly.

INDICATOR: The trainee demonstrates knowledge of electronic symbols.

BENCHMARK: The trainee identifies and names common electrical symbols used in schematics.

ASSESSMENT: SYMBOLS (continued)



COMPETENCY AREA: ELECTRONICS - ASSEMBLER/TEST TECHNICIAN

COMPETENCY STATEMENT: The trainee has a basic understanding of principles and concepts of electricity as applied to electronic assembly.

INDICATOR: The trainee demonstrates basic electrical construction skills and knowledge of terms and symbols commonly used in electronic assembly.

BENCHMARK: The trainee demonstrates the ability to interpret schematics, assembly instructions, work sheets, and information sheets necessary to assemble electronic components. He/she demonstrates knowledge of symbols, terms, and color codes used in assembly procedures.

ASSESSMENT: Given no less than five (5) projects to assemble electronic components, the trainee completes each project to the standards and specifications required.

Instructor indicates satisfactory completion.

COMPETENCY AREA: ELECTRONICS - ASSEMBLER/TEST TECHNICIAN

COMPETENCY STATEMENT: The trainee has a basic understanding of principles and concepts of electricity as applied to electronic assembly.

INDICATOR: The trainee demonstrates basic electrical construction skills and knowledge of terms and symbols commonly used in electronic assembly.

BENCHMARK: The trainee demonstrates the ability to interpret blueprints used in the assembly of electronic units.

ASSESSMENT: The trainee completes no less than five (5) projects demonstrating the ability to identify parts lists and notes, understand the electronic terms as it applies to the construction of the project, interpret abbreviations, and read the layout and symbols as it relates to the completion of the project. Trainees completed projects meet the standards and specifications of the blueprint.

Instructor indicates satisfactory completion.

| | |
|---|---|
| COMPETENCY AREA: | ELECTRONICS - ASSEMBLER/TEST TECHNICIAN |
| COMPETENCY STATEMENT: | The trainee has a basic understanding of principles and concepts of electricity as applied to electronic assembly. |
| INDICATOR: | The trainee demonstrates basic electrical construction skills used in electronic assembly. |
| BENCHMARK: | The trainee prepares, wraps, and solders wires to standard terminals according to specifications included in assembly instructions. |
| ASSESSMENT: | Given no less than five (5) projects using terminal boards, the trainee completes each project to the standards and specifications of the assembly instructions.<br><br>Instructor indicates satisfactory completion. |

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|---|---|
| COMPETENCY AREA: | ELECTRONICS - ASSEMBLER/TEST TECHNICIAN |
| COMPETENCY STATEMENT: | The trainee has a basic understanding of principles and concepts of electricity as applied to electronic assembly. |
| INDICATOR: | The trainee demonstrates basic electrical construction skills used in electronic assembly. |
| BENCHMARK: | The trainee assembles a complete harness used for electronic assemblies. |
| ASSESSMENT: | The trainee assembles no less than three (3) complete harnesses demonstrating the techniques of servicing loops, comb and dressing wires, spot ties, tube and sleeving.<br><br>Instructor indicates satisfactory completion. |

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|---|---|
| COMPETENCY AREA: | ELECTRONICS - ASSEMBLER/TEST TECHNICIAN |
| COMPETENCY STATEMENT: | The trainee has a basic understanding of principles and concepts of electricity as applied to electronic assembly. |
| INDICATOR: | The trainee demonstrates basic electrical construction skills used in electronic assembly. |
| BENCHMARK: | The trainee assembles a complete circuit board both single sided and double sided. |
| ASSESSMENT: | The trainee completes no less than three (3) single sided printed circuit boards and three (3) double sided printed circuit boards demonstrating the ability to work special configurations and use a microscope in the completion of tasks.<br><br>The instructor indicates satisfactory completion. |

COMPETENCY AREA: ELECTRONICS - ASSEMBLER/TEST TECHNICIAN

COMPETENCY STATEMENT: The trainee has a basic understanding of principles and concepts of electricity as applied to electronic assembly.

INDICATOR: The trainee demonstrates basic electrical construction skills used in electronic assembly.

BENCHMARK: The trainee demonstrates growth in cognitive, affective, and psychomotor skills as measured by the application of the following evaluative devices after and during each unit and/or at the end of the course.

1. Written test.
2. Continuous evaluation of manipulative skill development.
3. Final examination by construction of a working kit model.

ASSESSMENT: Trainee completes written exams with no less than 70% accuracy. Instructor's evaluations reflect student progress and learning of various assembly skills, and instructor indicates satisfactory completion of projects assigned during the program including final assembly project.

COMPETENCY AREA: ELECTRONICS - ASSEMBLER/TEST TECHNICIAN

COMPETENCY STATEMENT: The trainee has a basic understanding of principles and concepts of electricity as applied to electronic assembly.

INDICATOR: The trainee demonstrates electrical construction skills commonly used in electronic assembly.

BENCHMARK: The trainee demonstrates correct technique to touch up solder by:

1. Removing excessive solder, bridges, splashes, icicles, and balls.
2. Touches up holes in solder.
3. Re-solders cold, fractured, non-wetted, and de-wetted solder joints.
4. Re-solders insufficient solder joints.
5. Installs leads not completely through PCBA.
6. Installs components not yet mounted.
7. Corrects clinched lead causing possible shorts.
8. Cuts leads that are too long per Workmanship Standards Manual.
9. Corrects bent under I.C.'s and transistor leads.
10. Installs missing components.

ASSESSMENT: Instructor indicates that soldering and mounting of components meets or exceeds the "acceptable minimum" criteria as defined in Workmanship Standard Manual.

| | |
|---|---|
| COMPETENCY AREA: | ELECTRONICS - ASSEMBLER/TEST TECHNICIAN |
| COMPETENCY STATEMENT: | The trainee has a basic understanding of principles and concepts of electricity as applied to electronic assembly. |
| INDICATOR: | The trainee demonstrates electrical construction skills commonly used in electronic assembly. |
| BENCHMARK: | The trainee demonstrates the ability to use a thermal shunt and soldering iron by tinning no less than six (6) wires with each tool. |
| ASSESSMENT: | Instructor indicates satisfactory completion. |

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| COMPETENCY AREA: | ELECTRONICS - ASSEMBLER/TEST TECHNICIAN |
| COMPETENCY STATEMENT: | The trainee has a basic understanding of principles and concepts of electricity as applied to electronic assembly. |
| INDICATOR: | The trainee demonstrates electrical construction skills commonly used in electronic assembly. |
| BENCHMARK: | The trainee removes the correct amount of insulation from standard and solid wires by stripping six (6) of each type of wire. |
| ASSESSMENT: | Instructor indicates satisfactory completion. |

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| COMPETENCY AREA: | ELECTRONICS - ASSEMBLER/TEST TECHNICIAN |
| COMPETENCY STATEMENT: | The trainee has a basic understanding of principles and concepts of electricity as applied to electronic assembly. |
| INDICATOR: | The trainee demonstrates electrical construction skills commonly used in electronic assembly. |
| BENCHMARK: | The trainee forms six components and mounts and solders on a circuit board. He/she lists the specifications to be observed when mounting a resistor, simiconductor diode, and lists the advantages and disadvantages of a printed circuit board. |
| ASSESSMENT: | The trainee correctly uses the NSA (National Aeronautic and Space Administration) manual to follow regulations in forming the components and installing on the circuit board.<br><br>Instructor indicates satisfactory completion. |

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| COMPETENCY AREA: | ELECTRONICS - ASSEMBLER/TEST TECHNICIAN |
| COMPETENCY STATEMENT: | The trainee has a basic understanding of principles and concepts of electricity as applied to electronic assembly. |
| INDICATOR: | The trainee demonstrates electrical construction skills commonly used in electronic assembly. |
| BENCHMARK: | The trainee demonstrates the ability to mount components according to NSA and industry standards by mounting five (5) capacitors (mica), six (6) resistors and two (2) ICs on a terminal board or printed circuit board. |
| ASSESSMENT: | Instructor indicates satisfactory completion. |

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| COMPETENCY AREA: | ELECTRONICS - ASSEMBLER/TEST TECHNICIAN |
| COMPETENCY STATEMENT: | The trainee has a basic understanding of principles and concepts of electricity as applied to electronic assembly. |
| INDICATOR: | The trainee demonstrates electrical construction skills commonly used in electronic assembly. |
| BENCHMARK: | The trainee demonstrates the ability to wrap wire to a turret terminal by wrapping six (6) terminals with twelve wire using the upper and lower part on the turret terminal. |
| ASSESSMENT: | Instructor indicates trainee followed military specifications and work is satisfactory. |

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| COMPETENCY AREA: | ELECTRONICS - ASSEMBLER/TEST TECHNICIAN |
| COMPETENCY STATEMENT: | The trainee has a basic understanding of principles and concepts of electricity as applied to electronic assembly. |
| INDICATOR: | The trainee demonstrates electrical construction skills commonly used in electronic assembly. |
| BENCHMARK: | The trainee demonstrates the ability to effectively use a griping tool by installing solderless terminals on six (6) stranded wires. He/she states the advantages and disadvantages of using solderless terminals. |
| ASSESSMENT: | Instructor indicates satisfactory completion. |

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| COMPETENCY AREA: | ELECTRONICS - ASSEMBLER/TEST TECHNICIAN |
| COMPETENCY STATEMENT: | The trainee has a basic understanding of principles and concepts of electricity as applied to electronic assembly. |
| INDICATOR: | The trainee demonstrates electrical construction skills commonly used in electronic assembly. |
| BENCHMARK: | The trainee demonstrates the ability to attach solderless lugs by attaching a solderless terminal lug to a stranded wire. |
| ASSESSMENT: | Instructor indicates satisfactory completion. |

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| COMPETENCY AREA: | ELECTRONICS - ASSEMBLER/TEST TECHNICIAN |
| COMPETENCY STATEMENT: | The trainee has a basic understanding of principles and concepts of electricity as applied to electronic assembly. |
| INDICATOR: | The trainee demonstrates electrical construction skills commonly used in electronic assembly. |
| BENCHMARK: | The trainee demonstrates his/her knowledge of the Engineer Change Notice (ECN) by identifying the location of the ECN, the purpose of all parts of ECNs, and number from one to twenty as outlined on an ECN's interpretation sheet. |
| ASSESSMENT: | Instructor indicates satisfactory completion. |

COMPETENCY AREA: ELECTRONICS - ASSEMBLER/TEST TECHNICIAN

COMPETENCY STATEMENT: The trainee has a basic understanding of principles and concepts of electricity as applied to electronic assembly.

INDICATOR: The trainee demonstrates electrical construction skills commonly used in electronic assembly.

BENCHMARK: The trainee demonstrates his/her knowledge of the use of a Traveler Form by identifying and describing the meaning of the:

1. Work order number
2. Assembly number
3. Original quantity
4. Partical quantity
5. L/M revision
6. Operations sequence
7. Assemble

ASSESSMENT: Instructor indicates satisfactory completion.

COMPETENCY AREA: ELECTRONICS - ASSEMBLER/TEST TECHNICIAN

COMPETENCY STATEMENT: The trainee has a basic understanding of principles and concepts of electricity as applied to electronic assembly.

INDICATOR: The trainee demonstrates electrical construction skills commonly used in electronic assembly.

BENCHMARK: The trainee will demonstrate the ability to use a "pull list" by identifying, on a schematic the following:

1. Assembly to be built.
2. Quantity on order for pull list.
3. Part number.
4. Part description.
5. Pull quantity.
6. Quantity filled.
7. Quantity short for bagged component.
8. When and where to sign for work accomplished.

ASSESSMENT: Instructor indicates satisfactory completion.

OCCUPATION: TELEPHONE REPAIR AND INSTALLATION

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| COMPETENCY AREA: | ELECTRONICS - TELEPHONE REPAIR AND INSTALLATION |
| COMPETENCY STATEMENT: | The trainee develops fundamental knowledge and skills necessary for proficient telephone installation and maintenance of outside-plant equipment. |
| INDICATOR: | The trainee demonstrates the ability to install telephone station lines. |
| BENCHMARK: | The trainee demonstrates a fundamental understanding of terms commonly used in the field of telephone repair by completing vocabulary quiz #12 with no less than 80% accuracy. |
| ASSESSMENT: | The trainee matches terms with the correct definition by writing the correct word next to the appropriate definition. |

COMPETENCY AREA: ELECTRONICS - TELEPHONE REPAIR AND INSTALLATION

COMPETENCY STATEMENT: The trainee develops fundamental knowledge and skills necessary for proficient telephone installation and maintenance of outside-plant equipment.

INDICATOR: The trainee demonstrates the ability to install telephone station lines.

BENCHMARK: The trainee demonstrates his/her knowledge and use of telephone electronics by completing the following three tasks:

1. Completes a thirty-three (33) question test on OHM's Law.
2. Identifies color codes for basic cable installation.
3. Applies telephone electronics on basic telephone circuits.

ASSESSMENT: The trainee:

1. Completes a thirty-three (33) question test on OHM's Law with no less than 85% accuracy.
2. Completes a twenty-five (25) question test on color codes with no less than 85% accuracy.
3. Instructor observation of trainee's use of telephone electronics on basic telephone circuits indicates satisfactory completion.

COMPETENCY AREA: ELECTRONICS - TELEPHONE REPAIR AND INSTALLATION

COMPETENCY STATEMENT: The trainee develops fundamental knowledge and skills necessary for proficient telephone installation and maintenance of outside-plant equipment.

INDICATOR: The trainee demonstrates the ability to install telephone station lines.

BENCHMARK: The trainee demonstrates an understanding of the use of direct current in a telephone by identifying direct current and showing how it is used in the function of a telephone.

ASSESSMENT: The trainee:

1. Identifies the correct direct current to use on various pieces of telephone equipment.
2. Applies direct current on a telephone circuit.
3. Uses a VTVM to test telephone lines for direct current.

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| COMPETENCY AREA: | ELECTRONICS - TELEPHONE REPAIR AND INSTALLATION |
| COMPETENCY STATEMENT: | The trainee develops fundamental knowledge and skills necessary for proficient telephone installation and maintenance of outside-plant equipment. |
| INDICATOR: | The trainee demonstrates the ability to install telephone station lines. |
| BENCHMARK: | The trainee identifies alternating currents by applying alternating current on telephone circuits. |
| ASSESSMENT: | The trainee correctly uses a VTVM to identify the proper alternating current used on various pieces of telephone equipment.<br><br>Instructor indicates satisfactory completion. |

COMPETENCY AREA: ELECTRONICS - TELEPHONE REPAIR AND INSTALLATION

COMPETENCY STATEMENT: The trainee develops fundamental knowledge and skills necessary for proficient telephone installation and maintenance of outside-plant equipment.

INDICATOR: The trainee demonstrates the ability to install telephone station lines.

BENCHMARK: The trainee correctly applies basic electronic theory and practice when installing telephone systems by:

1. Correctly using terms relating to telephone systems.
2. Correctly using schematics.
3. Designing a telephone line installation plan.
4. Identifying a reasonable time frame for the installation.

ASSESSMENT: Instructor indicates approval of each telephone system the trainee completes. Evaluation criteria includes consideration of the installation plan, the time frame for installation, and the trainee's ability to utilize electronic terms effectively.

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| COMPETENCY AREA: | ELECTRONICS - TELEPHONE REPAIR AND INSTALLATION |
| COMPETENCY STATEMENT: | The trainee develops fundamental knowledge and skills necessary for proficient telephone installation and maintenance of outside-plant equipment. |
| INDICATOR: | The trainee demonstrates the ability to install telephone station lines. |
| BENCHMARK: | The trainee demonstrates the ability to test station lines and related equipment by correctly utilizing a VTVM to identify and repair equipment/line problems. |
| ASSESSMENT: | Given a line with no less than three (3) repair problems, the trainee uses the VTVM to identify the problem and then repair the problem completely within a set time frame established by the instructor.<br><br>Instructor indicates satisfactory completion. |

COMPETENCY AREA: ELECTRONICS - TELEPHONE REPAIR AND INSTALLATION

COMPETENCY STATEMENT: The trainee develops fundamental knowledge and skills necessary for proficient telephone installation and maintenance of outside-plant equipment.

INDICATOR: The trainee demonstrates the ability to install telephone station lines.

BENCHMARK: The trainee identifies, names, and demonstrates correct use of hand tools and power tools needed for the installation of telephone lines.

ASSESSMENT: Given a set of telephone installation hand/power tools, the trainee identifies and names the following hand tools and power tools with 100% accuracy:

Hand Tools

1. Pliers
   a. Slip joint
   b. Channel lock
   c. Side cutting
   d. Long nose
   e. Vise grip

2. Wrenches
   a. Open end
   b. Open end, adjustable
   c. Box
   d. Pipe
   e. Socket

3. Screwdrivers
   a. standard
   b. phillips

4. Soldering devices
   a. gun
   b. pencil

5. Hand drill

6. Rules
   a. steel
   b. wood, folding

(CONTINUED ON NEXT PAGE)

COMPETENCY AREA: ELECTRONICS - TELEPHONE REPAIR AND INSTALLATION

COMPETENCY STATEMENT: The trainee develops fundamental knowledge and skills necessary for proficient telephone installation and maintenance of outside-plant equipment.

INDICATOR: The trainee demonstrates the ability to install telephone station lines.

BENCHMARK: The trainee identifies, names, and demonstrates correct use of hand tools and power tools needed for the installation of telephone lines.

ASSESSMENT: TOOLS (continued)

7. Special tools
   a. wrap gun
   b. unwrap tools and wrap
   c. punch down tool
   d. butting tool
   e. cable shears
   f. cable strippers
   g. come along

Power Tools

1. Staple gun
2. Drill motor
3. Wire puller

Given projects which utilize hand tools and power tools, the trainee constantly demonstrates appropriate use of tools. Instructor indicates satisfactory completion.

COMPETENCY AREA: ELECTRONICS - TELEPHONE REPAIR AND INSTALLATION

COMPETENCY STATEMENT: The trainee develops fundamental knowledge and skills necessary for proficient telephone installation and maintenance of outside-plant equipment.

INDICATOR: The trainee demonstrates the ability to install telephone station lines.

BENCHMARK: The trainee properly uses a power drill to bore holes through stucco and wood. He/she correctly uses a staplegun to fasten telephone wire on base boards and under the house wood beams.

ASSESSMENT: Instructor indicates satisfactory completion.

COMPETENCY AREA: ELECTRONICS - TELEPHONE REPAIR AND INSTALLATION

COMPETENCY STATEMENT: The trainee develops fundamental knowledge and skills necessary for proficient telephone installation and maintenance of outside-plant equipment.

INDICATOR: The trainee demonstrates the ability to install telephone station lines.

BENCHMARK: The trainee demonstrates knowledge of wire types used in telephone installation by identifying wires and proper uses of wire in telephone installations.

ASSESSMENT: The trainee:

1. Completes a written exam on identification of wire types and wire gauge sizes with no less than 80% accuracy.

2. Given an assignment to install a station telephone, the trainee selects the correct wires.

3. Assembles a drop wire following correct procedure and selects wire in accordance with the American gauge wire sizes.

COMPETENCY AREA: ELECTRONICS - TELEPHONE REPAIR AND INSTALLATION

COMPETENCY STATEMENT: The trainee develops fundamental knowledge and skills necessary for proficient telephone installation and maintenance of outside-plant equipment.

INDICATOR: The trainee demonstrates the ability to install telephone station lines.

BENCHMARK: The trainee follows correct installation procedure when installing telephone equipment as demonstrated by installing one piece of telephone equipment within five minutes.

ASSESSMENT: The trainee proceeds as follows:

1. Puts equipment in correct order for installation.
2. Installs station wire at designated locations.
3. Tests equipment that is installed to assure that it is functioning properly.
4. Cleans up area and disposes of all scrap wire.

COMPETENCY AREA: ELECTRONICS - TELEPHONE REPAIR AND INSTALLATION

COMPETENCY STATEMENT: The trainee develops fundamental knowledge and skills necessary for proficient telephone installation and maintenance of outside-plant equipment.

INDICATOR: The trainee demonstrates the ability to install telephone station lines.

BENCHMARK: The trainee demonstrates the ability to climb a telephone pole by correctly ascending and descending a telephone pole adhering to necessary safety precautions.

ASSESSMENT: The trainee correctly ascends and descends a telephone pole no less than fifteen (15) times.

The trainee climbs the pole correctly demonstrating the "three point" climbing method as follows:

1. Uses the proper location for hands and feet when ascending and descending the pole.
2. Both hands and one foot is in constant contact with the pole when climbing.
3. When descending, the trainee maintains eye contact on the feet at all times.

COMPETENCY AREA: ELECTRONICS - TELEPHONE REPAIR AND INSTALLATION

COMPETENCY STATEMENT: The trainee develops fundamental knowledge and skills necessary for proficient telephone installation and maintenance of outside-plant equipment.

INDICATOR: The trainee demonstrates the ability to install telephone station lines.

BENCHMARK: The trainee demonstrates the proper use of a lineman's gaff and body belt by following safety procedures while climbing a telephone pole and completing a line hook-up.

ASSESSMENT: The trainee observes the following safety precautions:

1. Correctly applies and uses the lineman's gaff on each leg.
2. Properly uses and adjusts body belt and identifies the D-rings.
3. Properly uses safety strap and follows correct safety procedure. Notices color change on strap to note extensive use and wear.

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| COMPETENCY AREA: | ELECTRONICS - TELEPHONE REPAIR AND INSTALLATION |
| COMPETENCY STATEMENT: | The trainee develops fundamental knowledge and skills necessary for proficient telephone installation and maintenance of outside-plant equipment. |
| INDICATOR: | The trainee demonstrates the ability to install telephone station lines. |
| BENCHMARK: | The trainee realizes that he/she must maintain a good driving record to obtain employment as a telephone repair technician by demonstrating his/her ability to maintain a driving record which will qualify him/her for employment. |
| ASSESSMENT: | The trainee brings to the instructor a copy of his/her driving record from the Department of Motor Vehicles. The driving history shows no outstanding warrants, and provides sufficient evidence that the participant meets the employability driving standards of most telephone companies. |

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| COMPETENCY AREA: | ELECTRONICS - TELEPHONE REPAIR AND INSTALLATION |
| COMPETENCY STATEMENT: | The trainee develops fundamental knowledge and skills necessary for proficient telephone installation and maintenance of outside-plant equipment. |
| INDICATOR: | The trainee demonstrates the ability to install telephone station lines. |
| BENCHMARK: | The trainee enhances his/her ability to maintain a good driving record so that he/she is able to obtain employment with a telephone company by completing an examination on telephone company driving regulations and the California Vehicle Code. |
| ASSESSMENT: | The trainee completes the test with no less than 80% accuracy. |

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| COMPETENCY AREA: | ELECTRONICS - TELEPHONE REPAIR AND INSTALLATION |
| COMPETENCY STATEMENT: | The trainee develops fundamental knowledge and skills necessary for proficient telephone installation and maintenance of outside-plant equipment. |
| INDICATOR: | The trainee understands and observes telephone personnel rules of conduct, ethics, and safety. |
| BENCHMARK: | The trainee completes a written examination on telephone personnel rules of employee conduct, ethics, and safety. The trainee observes appropriate conduct and safety rules while attending the classroom training program. |
| ASSESSMENT: | The trainee completes a written examination on employee conduct, ethics, and safety with no less than 90% accuracy.<br><br>Instructor evaluation indicates trainee followed safety procedures and maintained appropriate conduct at all times. |

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| COMPETENCY AREA: | ELECTRONICS - TELEPHONE REPAIR AND INSTALLATION |
| COMPETENCY STATEMENT: | The trainee develops fundamental knowledge and skills necessary for proficient telephone installation and maintenance of outside-plant equipment. |
| INDICATOR: | The trainee demonstrates the ability to comprehend and successfully complete both written and practical pre-employment tests commonly used in the telephone industry. |
| BENCHMARK: | The trainee studies telephone company guides and completes homework assignments in preparation for job specific skill competency exams. |
| ASSESSMENT: | The trainee completes written and practical exams with no less than 80% accuracy. |

OCCUPATION: SECURITY ALARM INSTALLER

COMPETENCY AREA: ELECTRONICS - SECURITY ALARM INSTALLER

COMPETENCY STATEMENT: The trainee has a basic understanding of principles and concepts of electricity and develops skills necessary for proficient security alarm installation.

INDICATOR: The trainee demonstrates electrical construction skills commonly used in the alarm installation industry.

BENCHMARK: The trainee demonstrates an understanding of alarm installation terms by using the correct names and terms used in the alarm industry.

ASSESSMENT: The trainee successfully:

Passes a written examination on alarm installation terms and equipment identification and names with no less than 100% accuracy.

Lists no less than twenty (20) different terms used in alarm installation.

Uses correct name when referring to alarm equipment.

Instructor indicates satisfactory completion.

COMPETENCY AREA: ELECTRONICS - SECURITY ALARM INSTALLER

COMPETENCY STATEMENT: The trainee has a basic understanding of principles and concepts of electricity and develops skills necessary for proficient security alarm installation.

INDICATOR: The trainee demonstrates electrical construction skills commonly used in the alarm installation industry.

BENCHMARK: The trainee applies the principles and practices of electronic theory in the development of alarm installation skills.

ASSESSMENT: The trainee:

1) Correctly utilizes electronic terms.

2) Assembles basic alarm systems using schematics.

3) Designs an alarm system.

4) Identifies time frame for installation.

Instructor indicates satisfactory completion.

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| COMPETENCY AREA: | ELECTRONICS - SECURITY ALARM INSTALLER |
| COMPETENCY STATEMENT: | The trainee has a basic understanding of principles and concepts of electricity and develops skills necessary for proficient security alarm installation. |
| INDICATOR: | The trainee demonstrates electrical construction skills commonly used in the alarm installation industry. |
| BENCHMARK: | The trainee demonstrates the ability to follow correct safety procedures by completing a test on safety practices, adhering to classroom safety rules, operating equipment safely, and conducting him/herself appropriately while working around other trainees. |
| ASSESSMENT: | The trainee passes a safety test with no less than 100% accuracy.<br><br>Instructor indicates trainee adheres to classroom safety rules, uses equipment appropriately, and takes precautions while working around other trainees. |

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| COMPETENCY AREA: | ELECTRONICS - SECURITY ALARM INSTALLER |
| COMPETENCY STATEMENT: | The trainee has a basic understanding of principles and concepts of electricity and develops skills necessary for proficient security alarm installation. |
| INDICATOR: | The trainee demonstrates electrical construction skills commonly used in the alarm installation industry. |
| BENCHMARK: | The trainee demonstrates ability to utilized Ohms Law in its application to alarm installation by passing an examination on Ohms Law, identifying the correct color codes for resistances, and applying Ohms Law on basic alarms systems. |
| ASSESSMENT: | The trainee passes fifty (50) question examination on OHMs Law with no less than 85% accuracy.<br><br>The trainee completes verbal examination on color codes for resistance with no less than 90% accuracy.<br><br>The trainee tests alarm systems by the correct application of OHMs Law. Instructor indicates satisfactory completion. |

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| COMPETENCY AREA: | ELECTRONICS - SECURITY ALARM INSTALLER |
| COMPETENCY STATEMENT: | The trainee has a basic understanding of principles and concepts of electricity and develops skills necessary for proficient security alarm installation. |
| INDICATOR: | The trainee demonstrates electrical construction skills commonly used in the alarm installation industry. |
| BENCHMARK: | The trainee demonstrates the correct application of direct current theory by developing a basic direct current power supply. |
| ASSESSMENT: | The trainee uses basic direct current power supply on an alarm system to effectively activate the system.<br><br>Instructor indicates satisfactory completion. |

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| COMPETENCY AREA: | ELECTRONICS - SECURITY ALARM INSTALLER |
| COMPETENCY STATEMENT: | The trainee has a basic understanding of principles and concepts of electricity and develops skills necessary for proficient security alarm installation. |
| INDICATOR: | The trainee demonstrates electrical construction skills commonly used in the alarm installation industry. |
| BENCHMARK: | The trainee identifies alternating currents and applies alternating current on alarm circuits. |
| ASSESSMENT: | The trainee correctly uses a VTVM to identify the proper alternating current used on various pieces of alarm equipment.<br><br>Instructor indicates satisfactory completion. |

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| COMPETENCY AREA: | ELECTRONICS - SECURITY ALARM INSTALLER |
| COMPETENCY STATEMENT: | The trainee has a basic understanding of principles and concepts of electricity and develops skills necessary for proficient security alarm installation. |
| INDICATOR: | The trainee demonstrates electrical construction skills commonly used in the alarm installation industry. |
| BENCHMARK: | The trainee demonstrates knowledge and ability to use the proper circuit for alarm installation by setting up a series circuit and effectively using a parallel circuit and series circuit combination. |
| ASSESSMENT: | The trainee selects and correctly uses a wire 22 twist for installation.<br><br>Given a project to install an alarm system, the trainee selects the correct circuit.<br><br>Given a test on various circuits, the trainee completes the examination with no less than 100% accuracy. |

COMPETENCY AREA: ELECTRONICS - SECURITY ALARM INSTALLER

COMPETENCY STATEMENT: The trainee has a basic understanding of principles and concepts of electricity and develops skills necessary for proficient security alarm installation.

INDICATOR: The trainee demonstrates electrical construction skills commonly used in the alarm installation industry.

BENCHMARK: The trainee demonstrates knowledge of wire types used in alarm installation by identifying wires and proper uses of wire in alarm installation.

ASSESSMENT: The trainee:

1) Completes a written exam on identification of wire types and wire gauge sizes with no less than 80% accuracy.

2) Given an assignment to assemble wire circuits according to schematics, the trainee selects the correct wires.

3) Given a project to install an alarm system, the trainee selects the correct wires to complete the job.

Instructor indicates satisfactory completion of projects.

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| COMPETENCY AREA: | ELECTRONICS - SECURITY ALARM INSTALLER |
| COMPETENCY STATEMENT: | The trainee has a basic understanding of principles and concepts of electricity and develops skills necessary for proficient security alarm installation. |
| INDICATOR: | The trainee demonstrates electrical construction skills commonly used in the alarm installation industry. |
| BENCHMARK: | The trainee demonstrates the ability to correctly use small hand tools by identifying and naming installation tools and completing a project to assemble one piece of alarm equipment. |
| ASSESSMENT: | The trainee successfully passes a written examination on hand tool identification with no less than 100% accuracy.<br><br>Given a project to assemble and install one piece of simple alarm equipment, the trainee selects proper hand tools and uses them effectively. Instructor indicates satisfactory completion. |

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| COMPETENCY AREA: | ELECTRONICS - SECURITY ALARM INSTALLER |
| COMPETENCY STATEMENT: | The trainee has a basic understanding of principles and concepts of electricity and develops skills necessary for proficient security alarm installation. |
| INDICATOR: | The trainee demonstrates electrical construction skills commonly used in the alarm installation industry. |
| BENCHMARK: | The trainee demonstrates the ability to correctly use power tools by identifying and naming alarm installation power tools and completing a project to install alarm equipment requiring the use of power tools. |
| ASSESSMENT: | The trainee successfully passes a written examination on power tool identification with no less than 100% accuracy.<br><br>Given an assignment to intall an alarm which requires the use of power tools, the trainee selects the correct tool and uses it effectively. Instructor indicates satisfactory completion |

COMPETENCY AREA: ELECTRONICS - SECURITY ALARM INSTALLER

COMPETENCY STATEMENT: The trainee has a basic understanding of principles and concepts of electricity and develops skills necessary for proficient security alarm installation.

INDICATOR: The trainee demonstrates electrical construction skills commonly used in the alarm installation industry.

BENCHMARK: The trainee demonstrates his/her ability to correctly use a ram-set fastener gun by utilizing the gun to fasten down selected pieces of equipment.

ASSESSMENT: Instructor observation indicates the trainee:

Exercised extreme caution while working with the ram-set gun.

Successfully secured equipment using the ram-set gun.

Correctly adjusted the ram-set. Given a non-functional set, the trainee was able to repair the gun.

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| COMPETENCY AREA: | ELECTRONICS - SECURITY ALARM INSTALLER |
| COMPETENCY STATEMENT: | The trainee has a basic understanding of principles and concepts of electricity and develops skills necessary for proficient security alarm installation. |
| INDICATOR: | The trainee demonstrates electrical construction skills commonly used in the alarm installation industry. |
| BENCHMARK: | Given information from an alarm schematic, the trainee assembles the alarm and tests the system for workability. |
| ASSESSMENT: | The trainee has interpreted the schematic correctly and built an alarm which works on 100% of the tests. |

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| COMPETENCY AREA: | ELECTRONICS - SECURITY ALARM INSTALLER |
| COMPETENCY STATEMENT: | The trainee has a basic understanding of principles and concepts of electricity and develops skills necessary for proficient security alarm installation. |
| INDICATOR: | The trainee demonstrates electrical construction skills commonly used in the alarm installation industry. |
| BENCHMARK: | The trainee demonstrates the ability to assemble alarm equipment and install according to schematics. |
| ASSESSMENT: | The trainee demonstrates correct installation procedure by setting equipment in proper order for installation and assembling one piece of alarm equipment within ten (10) minutes.<br><br>Instructor indicates satisfactory completion. |

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| COMPETENCY AREA: | ELECTRONICS - SECURITY ALARM INSTALLER |
| COMPETENCY STATEMENT: | The trainee has a basic understanding of principles and concepts of electricity and develops skills necessary for proficient security alarm installation. |
| INDICATOR: | The trainee demonstrates electrical construction skills commonly used in the alarm installation industry. |
| BENCHMARK: | The trainee demonstrates the ability to service and repair burglar and fire alarms by repairing no less than one of each type. |
| ASSESSMENT: | The trainee correctly identifies the problem, makes the necessary adjustments, and the equipment is operational.<br><br>Instructor indicates satisfactory completion. |

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| COMPETENCY AREA: | ELECTRONICS - SECURITY ALARM INSTALLER |
| COMPETENCY STATEMENT: | The trainee has a basic understanding of principles and concepts of electricity and develops skills necessary for proficient security alarm installation. |
| INDICATOR: | The trainee demonstrates electrical construction skills commonly used in the alarm installation industry. |
| BENCHMARK: | The trainee demonstrates the ability to use a VTVM by testing motion and sensors on an alarm system. |
| ASSESSMENT: | Utilizing a VTVM, the trainee identifies problems in an alarm system. Instructor indicates satisfactory completion. |

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| COMPETENCY AREA: | ELECTRONICS - SECURITY ALARM INSTALLER |
| COMPETENCY STATEMENT: | The trainee has a basic understanding of principles and concepts of electricity and develops skills necessary for proficient security alarm installation. |
| INDICATOR: | The trainee demonstrates electrical construction skills commonly used in the alarm installation industry. |
| BENCHMARK: | The trainee demonstrates the ability to install motion detectors by selecting the proper motion detectors for installation and correctly following the schematic to complete the project. |
| ASSESSMENT: | The trainee selects the correct installation equipment including the proper motion detectors, picks the correct wire diagrams for installation , and completes the job effectively. Instructor indicates satisfactory completion. |

COMPETENCY AREA: ELECTRONICS - SECURITY ALARM INSTALLER

COMPETENCY STATEMENT: The trainee has a basic understanding of principles and concepts of electricity and develops skills necessary for proficient security alarm installation.

INDICATOR: The trainee demonstrates electrical construction skills commonly used in the alarm installation industry.

BENCHMARK: The trainee demonstrates knowledge of closed circuit television systems by correctly assembling a closed circuit television system.

ASSESSMENT: The trainee successfully completes the task by correctly following assembly instructions, selecting the appropriate installation equipment, and effectively utilizing closed circuit cameras for installation.

Instructor indicates successful completion of project.

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| COMPETENCY AREA: | ELECTRONICS - SECURITY ALARM INSTALLER |
| COMPETENCY STATEMENT: | The trainee has a basic understanding of principles and concepts of electricity and develops skills necessary for proficient security alarm installation. |
| INDICATOR: | The trainee demonstrates electrical construction skills commonly used in the alarm installation industry. |
| BENCHMARK: | The trainee demonstrates knowledge of various applications of equipment used for fire protection by installing and designing operational systems in all phases of fire alarm protection. |
| ASSESSMENT: | Trainee completes an examination on fire alarm equipment and application with no less than 85% accuracy.<br><br>Given fire alarm information, the trainee designs a system for fire protection.<br><br>The trainee displays and assembles fire alarm system as designed.<br><br>Trainee tests and makes operational wet and dry fire alarm systems. |

COMPETENCY AREA: ELECTRONICS - SECURITY ALARM INSTALLER

COMPETENCY STATEMENT: The trainee has a basic understanding of principles and concepts of electricity and develops skills necessary for proficient security alarm installation.

INDICATOR: The trainee demonstrates electrical construction skills commonly used in the alarm installation industry.

BENCHMARK: The trainee demonstrates an understanding of structure and building techniques used in framing of homes by assembling alarm systems on structures and running circuits in walls, floors, basement, and attics.

ASSESSMENT: Given projects to run standard circuits in beams and structures including attics and basements, instructor observation indicates satisfactory completion of work both in accuracy and quality of workmanship.

Given a project to repair stucco walls using plaster where wire is run, the trainee is able to frame for repair where damage is done. Instructor observation indicates satisfactory completion of projects.

COMPETENCY AREA: ELECTRONICS - SECURITY ALARM INSTALLER

COMPETENCY STATEMENT: The trainee has a basic understanding of principles and concepts of electricity and develops skills necessary for proficient security alarm installation.

INDICATOR: The trainee demonstrates electrical construction skills commonly used in the alarm installation industry.

BENCHMARK: The trainee demonstrates the required knowledge and skills needed to install and repair a basic 115 volt house electrical system for use with an alarm system.

ASSESSMENT: The trainee:

1) Identifies basic home electrical components.

2) Passes written and oral examination on 115 volt system and its use.

3) Installs an alarm system on a 115 volt circuit.

4) Displays care and consideration for safety when working with 115 volt systems.

Instructor indicates satisfactory completion.

COMPETENCY AREA: ELECTRONICS - SECURITY ALARM INSTALLER

COMPETENCY STATEMENT: The trainee has a basic understanding of principles and concepts of electricity and develops skills necessary for proficient security alarm installation.

INDICATOR: The trainee demonstrates electrical construction skills commonly used in the alarm installation industry.

BENCHMARK: The trainee demonstrates the ability to design and install an alarm system for any type of automotive vehicle by installing alarm protection on all entry and openings on a car.

ASSESSMENT: The trainee:

1) Passes a 15 part written examination on auto alarm systems with no less than 85% accuracy.

2) Designs a basic protection system for a car.

3) Assembles auto alarm prior to installation and tests his/her design.

4) Installs the correct alarm equipment for protection on a vehicle and tests for workability. System is effectively operative.

Instructor indicates satisfactory completion of all project assignments.

COMPETENCY AREA: ELECTRONICS - SECURITY ALARM INSTALLER

COMPETENCY STATEMENT: The trainee has a basic understanding of principles and concepts of electricity and develops skills necessary for proficient security alarm installation.

INDICATOR: The trainee demonstrates electrical construction skills commonly used in the alarm installation industry.

BENCHMARK: The trainee realizes that he/she must maintain a good driving record to obtain employment as a security alarm technician by demonstrating his/her ability to maintain a driving record which will qualify him/her for employment in the alarm industry.

ASSESSMENT: The trainee brings to the instructor a copy of his/her driving record form the Department of Motor Vehicles. The driving history shows no outstanding warrants, and provides sufficient evidence that the participant meets the employability driving standard of most security alarm installation companies.

COMPETENCY AREA: ELECTRONICS - SECURITY ALARM INSTALLER

COMPETENCY STATEMENT: The trainee has a basic understanding of principles and concepts of electricity and develops skills necessary for proficient security alarm installation.

INDICATOR: The trainee demonstrates electrical construction skills commonly used in the alarm installation industry.

BENCHMARK: The trainee demonstrates knowledge of rules of conduct for security alarm company personnel by passing an examination on proper conduct of personnel on the job site including customer relations and proper conduct in private homes and commercial businesses.

ASSESSMENT: The trainee completes the examination with no less than 90% accuracy.

Instructors evaluation indicates the trainee followed classroom conduct policies.

OCCUPATION: VIDEO CASSETTE RECORDER SERVICING

COMPETENCY AREA: ELECTRONICS - VIDEO CASSETTE RECORDER SERVICING

COMPETENCY STATEMENT: The trainee has fundamental knowledge and skills necessary for proficient repair and maintenance of common types of video cassette recorders (VCR).

INDICATOR: The trainee demonstrates the ability to effectively install, repair, and perform routine maintenance functions on common types of VCR machines.

BENCHMARK: The trainee identifies requirements needed to become an entry-level employee in the VCR servicing industry.

ASSESSMENT: The trainee provides the following information:

1. Good health (vision, hearing, able to distinguish colors, able to lift 50 lbs.)
2. Know what safety precautions to take when working with electricity and be able to pass a safety test.
3. Must have a good driving record and possess a current drivers license.
4. Ability to read and write English.
5. Must be bondable.
6. Must have knowledge and skill to repair VCR equipment.

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| COMPETENCY AREA: | ELECTRONICS - VIDEO CASSETTE RECORDER SERVICING |
| COMPETENCY STATEMENT: | The trainee has fundamental knowledge and skills necessary for proficient repair and maintenance of common types of video cassette recorders (VCR). |
| INDICATOR: | The trainee demonstrates the ability to effectively install, repair, and perform routine maintenance functions on common types of VCR machines. |
| BENCHMARK: | The trainee identifies the components of a VCR by passing a test with no less than 100% accuracy. |
| ASSESSMENT: | The trainee correctly labels VCR components on a picture diagram. |

COMPETENCY AREA: ELECTRONICS - VIDEO CASSETTE RECORDER SERVICING

COMPETENCY STATEMENT: The trainee has fundamental knowledge and skills necessary for proficient repair and maintenance of common types of video cassette recorders (VCR).

INDICATOR: The trainee demonstrates the ability to effectively install, repair, and perform routine maintenance functions on common types of VCR machines.

BENCHMARK: The trainee identifies, names, and properly uses tools and equipment commonly used in the VCR industry.

ASSESSMENT: The trainee completes VCR repair projects which require the use of the following items:

1. Hand tools; various pliers, wire strippers, screwdrivers, wrenches, nut drivers, and head cleaners.
2. Soldering iron; demonstrates various techniques.
3. Multimeters
4. Oscilloscope
5. Signal generator
6. Sweep generator
7. Frequency counter
8. Vector scope
9. Correct use of power supplies

Instructor indicates satisfactory application of each item.

COMPETENCY AREA: ELECTRONICS - VIDEO CASSETTE RECORDER SERVICING

COMPETENCY STATEMENT: The trainee has fundamental knowledge and skills necessary for proficient repair and maintenance of common types of video cassette recorders (VCR).

INDICATOR: The trainee demonstrates the ability to effectively install, repair, and perform routine maintenance functions on common types of VCR machines.

BENCHMARK: The trainee demonstrates his/her knowledge of basic electronic theory by building and testing various types of circuits.

ASSESSMENT: The trainee performs the following:

1. Builds and/or conducts tests on the following circuit types;

    a. Series circuit
    b. Parallel circuit
    c. Combination circuit
    d. Time controlled circuit
    e. Resistance-inductance circuit
    f. Transistors and integrated circuits

2. Conducts tests for;

    a. Capacitance
    b. Inductance
    c. Resonance

3. Tests;

    a. Amplifiers and oscillators

4. Demonstrates an understanding of power supply.

Instructor indicates satisfactory knowledge of basic electronic theory.

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| COMPETENCY AREA: | ELECTRONICS - VIDEO CASSETTE RECORDER SERVICING |
| COMPETENCY STATEMENT: | The trainee has fundamental knowledge and skills necessary for proficient repair and maintenance of common types of video cassette recorders (VCR). |
| INDICATOR: | The trainee demonstrates the ability to effectively install, repair, and perform routine maintenance functions on common types of VCR machines. |
| BENCHMARK: | The trainee applies diagnostic techniques and procedures by correctly following a trouble shooting check list. |
| ASSESSMENT: | Given a project to analyze a VCR repair job, the trainee tests and checks-off each component following the correct order. He/she identifies problems accurately.<br><br>Instructor indicates satisfactory completion. |

COMPETENCY AREA: ELECTRONICS - VIDEO CASSETTE RECORDER SERVICING

COMPETENCY STATEMENT: The trainee has fundamental knowledge and skills necessary for proficient repair and maintenance of common types of video cassette recorders (VCR).

INDICATOR: The trainee demonstrates the ability to effectively install, repair, and perform routine maintenance functions on common types of VCR machines.

BENCHMARK: The trainee identifies, reads, and follows directions in technical manuals to repair specific VCR functions.

ASSESSMENT: The trainee completes no less than ten (10) projects to repair VCR malfunctions by:

1. Correct diagnosis of the problem.
2. Locates directions in the technical assistance manual to proceed with the job.
3. Selects proper tools for the repair.
4. Interprets the schematic correctly.
5. Completes job and shows VCR equipment is working properly.

Instructor approves finished project.

COMPETENCY AREA: ELECTRONICS - VIDEO CASSETTE RECORDER SERVICING

COMPETENCY STATEMENT: The trainee has fundamental knowledge and skills necessary for proficient repair and maintenance of common types of video cassette recorders (VCR).

INDICATOR: The trainee demonstrates the ability to effectively install, repair, and perform routine maintenance functions on common types of VCR machines.

BENCHMARK: The trainee applies VCR concepts and principles to practical applications by successfully completing laboratory assignments which meet industry entry-level employment requirements.

ASSESSMENT: The trainee demonstrates employability skills and related knowledge by correctly:

1. Cleaning and repairing VCR heads.
2. Cleaning the VCR.
3. Applying direct current voltage and alternating current voltage.
4. Interpreting signal wave forms.
5. Interpreting elements of resistance.
6. Using the multimeter.
7. Using the oscilloscope.
8. Using color-bar generator.
9. Repairing VCR belt.
10. Applying vectorscope.
11. Applying demodulator probe.
12. Applying sweep generator.
13. Applying direct current power supply.
14. Applying signal injection and signal trace.

Instructor indicates satisfactory completion.

COMPETENCY AREA: ELECTRONICS - VIDEO CASSETTE RECORDER SERVICING

COMPETENCY STATEMENT: The trainee has fundamental knowledge and skills necessary for proficient repair and maintenance of common types of video cassette recorders (VCR).

INDICATOR: The trainee demonstrates the ability to effectively install, repair, and perform routine maintenance functions on common types of VCR machines.

BENCHMARK: The trainee identifies, selects, and installs a residential-type television antenna system.

ASSESSMENT: Given a project to hook-up a residential television antenna, the trainee:

1. Distinguishes between antenna types by identifying the proper antenna for the job.
2. Identifies a suitable location for the antenna.
3. Correctly installs the antenna utilizing the appropriate tools.

Instructor indicates satisfactory completion.

COMPETENCY AREA: ELECTRONICS - VIDEO CASSETTE RECORDER SERVICING

COMPETENCY STATEMENT: The trainee has fundamental knowledge and skills necessary for proficient repair and maintenance of common types of video cassette recorders (VCR).

INDICATOR: The trainee demonstrates the ability to effectively install, repair, and perform routine maintenance functions on common types of VCR machines.

BENCHMARK: The trainee demonstrates the correct applications of methods and procedures for home servicing VCRs.

ASSESSMENT: The trainee completes projects demonstrating skills to effectively:

1. Replace modules.
2. Service tuner.
3. Write work orders.
4. Interpret work orders to re-route parts and calls.
5. Replace components.
6. Remove chassis.
7. Pass a written examination on customer relations with no less than 90% accuracy.

Instructor indicates satisfactory completion of projects.

OCCUPATION: CABLE TELEVISION INSTALLATION

COMPETENCY AREA: ELECTRONICS - CABLE TELEVISION INSTALLATION

COMPETENCY STATEMENT: The trainee has the fundamental knowledge and skills necessary to properly install and maintain cable television equipment.

INDICATOR: The trainee demonstrates the ability to effectively install, repair, and perform routine maintenance functions on cable television systems.

BENCHMARK: The trainee demonstrates the ability to follow correct safety procedures by completing a test on safety practices, adhering to classroom safety rules, operating equipment safely, and conducting him/herself appropriately while working around other trainees.

ASSESSMENT: The trainee passes a safety test with no less than 100% accuracy.

Instructor indicates trainee adheres to classroom safety rules, uses equipment appropriately, and takes precautions while working around other trainees.

COMPETENCY AREA: ELECTRONICS - CABLE TELEVISION INSTALLATION

COMPETENCY STATEMENT: The trainee has the fundamental knowledge and skills necessary to properly install and maintain cable television equipment.

INDICATOR: The trainee demonstrates the ability to effectively install, repair, and perform routine maintenance functions on cable television systems.

BENCHMARK: The trainee completes a written examination on cable TV personnel rules of employee conduct, ethics, and safety. The trainee observes appropriate conduct and safety rules while attending the classroom training program.

ASSESSMENT: The trainee completes a written examination on employee conduct, ethics, and safety with no less than 90% accuracy.

Instructor evaluation indicates trainee followed safety procedures and maintained appropriate conduct at all times.

COMPETENCY AREA: ELECTRONICS - CABLE TELEVISION INSTALLATION

COMPETENCY STATEMENT: The trainee has the fundamental knowledge and skills necessary to properly install and maintain cable television equipment.

INDICATOR: The trainee demonstrates the ability to effectively install, repair, and perform routine maintenance functions on cable television systems.

BENCHMARK: The trainee enhances his/her ability to maintain a good driving record so that he/she is able to obtain employment with a cable TV company by completing an examination on cable TV company driving regulations and the California Vehicle Code.

ASSESSMENT: The trainee completes the test with no less than 80% accuracy.

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| COMPETENCY AREA: | ELECTRONICS - CABLE TELEVISION INSTALLATION |
| COMPETENCY STATEMENT: | The trainee has the fundamental knowledge and skills necessary to properly install and maintain cable television equipment. |
| INDICATOR: | The trainee demonstrates the ability to effectively install, repair, and perform routine maintenance functions on cable television systems. |
| BENCHMARK: | The trainee realizes that he/she must maintain a good driving record to obtain employment as a cable TV installer by demonstrating his/her ability to maintain a driving record which will qualify him/her for employment. |
| ASSESSMENT: | The trainee brings to the instructor a copy of his/her driving record from the Department of Motor Vehicles. The driving history shows no outstanding warrants, and provides sufficient evidence that the participant meets the employability driving standards of most cable TV companies. |

COMPETENCY AREA: ELECTRONICS - CABLE TELEVISION INSTALLATION

COMPETENCY STATEMENT: The trainee has the fundamental knowledge and skills necessary to properly install and maintain cable television equipment.

INDICATOR: The trainee demonstrates the ability to effectively install, repair, and perform routine maintenance functions on cable television systems.

BENCHMARK: The trainee demonstrates knowledge of wire types used in cable installation by identifying wires and proper use of wire in cable installations.

ASSESSMENT: The trainee:

1. Completes a written exam on identification of wire types and wire gauge sizes with no less than 80% accuracy.

2. Given an assignment to install a cable line, the trainee selects the correct wires.

Instructor indicates satisfactory completion.

COMPETENCY AREA: ELECTRONICS - CABLE TELEVISION INSTALLATION

COMPETENCY STATEMENT: The trainee has the fundamental knowledge and skills necessary to properly install and maintain cable television equipment.

INDICATOR: The trainee demonstrates the ability to effectively install, repair, and perform routine maintenance functions on cable television systems.

BENCHMARK: The trainee identifies, names, and demonstrate correct use of hand tools and power tools needed for the installation of cable lines.

ASSESSMENT: The trainee:

1. Given a set of cable TV installation hand/power tools, identifies and names each tool with 100% accuracy.
2. Given a cable line to assemble, selects the correct tools and uses them appropriately.

Instructor indicates satisfactory completion.

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| COMPETENCY AREA: | ELECTRONICS - CABLE TELEVISION INSTALLATION |
| COMPETENCY STATEMENT: | The trainee has the fundamental knowledge and skills necessary to properly install and maintain cable television equipment. |
| INDICATOR: | The trainee demonstrates the ability to effectively install, repair, and perform routine maintenance functions on cable television systems. |
| BENCHMARK: | The trainee uses a power drill to bore holes through stucco and wood. He/she correctly uses a staplegun to fasten cable wire on base boards and under the house wood beams. |
| ASSESSMENT: | Instructor indicates satisfactory completion. |

COMPETENCY AREA: ELECTRONICS - CABLE TELEVISION INSTALLATION

COMPETENCY STATEMENT: The trainee has the fundamental knowledge and skills necessary to properly install and maintain cable television equipment.

INDICATOR: The trainee demonstrates the ability to effectively install, repair, and perform routine maintenance functions on cable television systems.

BENCHMARK: The trainee demonstrates a fundamental understanding of terms commonly used in the cable television industry by completing a written vocabulary quiz with no less than 80% accuracy.

ASSESSMENT: The trainee matches terms with the correct definition by writing the correct word next to the appropriate definition.

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| COMPETENCY AREA: | ELECTRONICS - CABLE TELEVISION INSTALLATION |
| COMPETENCY STATEMENT: | The trainee has the fundamental knowledge and skills necessary to properly install and maintain cable television equipment. |
| INDICATOR: | The trainee demonstrates the ability to effectively install, repair, and perform routine maintenance functions on cable television systems. |
| BENCHMARK: | The trainee identifies and names the components of a television set and a cable line. |
| ASSESSMENT: | The trainee completes a verbal quiz with no less than 80% accuracy. The trainee identifies and correctly names the components. Instructor indicates satisfactory completion. |

COMPETENCY AREA: ELECTRONICS - CABLE TELEVISION INSTALLATION

COMPETENCY STATEMENT: The trainee has the fundamental knowledge and skills necessary to properly install and maintain cable television equipment.

INDICATOR: The trainee demonstrates the ability to effectively install, repair, and perform routine maintenance functions on cable television systems.

BENCHMARK: The trainee correctly applies basic electronic theory and practice when installing cable systems by:

1. Correctly using terms relating to cable systems.
2. Correctly following installation plans.
3. Designing a cable TV line installation plan.
4. Designing a reasonable time frame for the installation.

ASSESSMENT: Instructor indicates approval of each cable system the trainee completes. Evaluation criteria includes consideration of the installation plan, the time it took to install the equipment, and the trainee's ability to utilized electronic terms appropriately.

COMPETENCY AREA: ELECTRONICS - CABLE TELEVISION INSTALLATION

COMPETENCY STATEMENT: The trainee has the fundamental knowledge and skills necessary to properly install and maintain cable television equipment.

INDICATOR: The trainee demonstrates the ability to effectively install, repair, and perform routine maintenance functions on cable television systems.

BENCHMARK: The trainee demonstrates his/her knowledge and use of Ohm's Law by completing the following three tasks:

1. Completes a fifty (50) question test on Ohm's Law.
2. Identifies color codes for basic cable installation.
3. Applies Ohm's Law on basic cable TV circuits.

ASSESSMENT: The trainee:

1. Completes a fifty (50) question test on Ohm's Law with no less than 85% accuracy.
2. Completes a ten (10) question test on color codes with no less than 85% accuracy.

Instructor observation of trainee's use of Ohm's Law on basic cable TV circuits indicates satisfactory completion.

COMPETENCY AREA: ELECTRONICS - CABLE TELEVISION INSTALLATION

COMPETENCY STATEMENT: The trainee has the fundamental knowledge and skills necessary to properly install and maintain cable television equipment.

INDICATOR: The trainee demonstrates the ability to effectively install, repair, and perform routine maintenance functions on cable television systems.

BENCHMARK: The trainee demonstrates an understanding of the use of direct current in a cable circuit by identifying direct current and showing how it is used in the function of a cable line.

ASSESSMENT: The trainee:

1. Identifies the correct direct current to use on various pieces of cable equipment.
2. Applies direct current on a cable circuit.
3. Uses a VTVM to test cable lines for direct current.

COMPETENCY AREA: ELECTRONICS - CABLE TELEVISION INSTALLATION

COMPETENCY STATEMENT: The trainee has the fundamental knowledge and skills necessary to properly install and maintain cable television equipment.

INDICATOR: The trainee demonstrates the ability to effectively install, repair, and perform routine maintenance functions on cable television systems.

BENCHMARK: The trainee identifies alternating currents and applies alternating current on cable circuits.

ASSESSMENT: The trainee correctly uses a VTVM to identify the proper alternating current used on various pieces of cable equipment.

Instructor indicates satisfactory completion.

COMPETENCY AREA: ELECTRONICS - CABLE TELEVISION INSTALLATION

COMPETENCY STATEMENT: The trainee has the fundamental knowledge and skills necessary to properly install and maintain cable television equipment.

INDICATOR: The trainee demonstrates the ability to effectively install, repair, and perform routine maintenance functions on cable television systems.

BENCHMARK: The trainee demonstrates the correct use of a signal level meter by identifying each scales purpose and showing how to store the meter.

ASSESSMENT: Instructor indicates satisfactory completion.

COMPETENCY AREA: ELECTRONICS - CABLE TELEVISION INSTALLATION

COMPETENCY STATEMENT: The trainee has the fundamental knowledge and skills necessary to properly install and maintain cable television equipment.

INDICATOR: The trainee demonstrates the ability to effectively install, repair, and perform routine maintenance functions on cable television systems.

BENCHMARK: The trainee demonstrates the ability to climb a telephone pole by correctly ascending and descending a telephone pole adhering to necessary safety precautions.

ASSESSMENT: The trainee correctly ascends and descends a telephone pole no less than fifteen (15) times.

COMPETENCY AREA: ELECTRONICS - CABLE TELEVISION INSTALLATION

COMPETENCY STATEMENT: The trainee has the fundamental knowledge and skills necessary to properly install and maintain cable television equipment.

INDICATOR: The trainee demonstrates the ability to effectively install, repair, and perform routine maintenance functions on cable television systems.

BENCHMARK: The trainee demonstrates the proper use of a lineman's gaff, body belt, and safety strap by following safety procedures while climbing a telephone pole and completing an antenna hook-up.

ASSESSMENT: The trainee observes the following safety precautions:

1. Checks body strap for wear.
2. Properly mounts gaffs on both legs.
3. Keeps two hands and one foot on pole when climbing.
4. Focuses eyes on feet when descending pole.

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| COMPETENCY AREA: | ELECTRONICS - CABLE TELEVISION INSTALLATION |
| COMPETENCY STATEMENT: | The trainee has the fundamental knowledge and skills necessary to properly install and maintain cable television equipment. |
| INDICATOR: | The trainee demonstrates the ability to effectively install, repair, and perform routine maintenance functions on cable television systems. |
| BENCHMARK: | The trainee demonstrates the ability of hook-up a cable line while working in a cherry picker. |
| ASSESSMENT: | Instructor indicates satisfactory completion. |

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| COMPETENCY AREA: | ELECTRONICS - CABLE TELEVISION INSTALLATION |
| COMPETENCY STATEMENT: | The trainee has the fundamental knowledge and skills necessary to properly install and maintain cable television equipment. |
| INDICATOR: | The trainee demonstrates the ability to effectively install, repair, and perform routine maintenance functions on cable television systems. |
| BENCHMARK: | The trainee demonstrates the ability to safely carry, raise, lower, and climb a ladder by carrying a twenty-four (24) foot extension ladder no less than fifty (50) feet and raising the ladder, climbing up and down safely, and then lowering the ladder. |
| ASSESSMENT: | Instructor indicates satisfactory completion. |

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| COMPETENCY AREA: | ELECTRONICS - CABLE TELEVISION INSTALLATION |
| COMPETENCY STATEMENT: | The trainee has the fundamental knowledge and skills necessary to properly install and maintain cable television equipment. |
| INDICATOR: | The trainee demonstrates the ability to effectively install, repair, and perform routine maintenance functions on cable television systems. |
| BENCHMARK: | The trainee demonstrates the correct use of a coaxial cable by installing a housedrop cable to the tap located eighteen (18) feet up on the pole and then connects cable to house tap. |
| ASSESSMENT: | The trainee's connection meets all standards in Code Book order #95 for above ground installations. Instructor indicates satisfactory completion. |

COMPETENCY AREA: ELECTRONICS - CABLE TELEVISION INSTALLATION

COMPETENCY STATEMENT: The trainee has the fundamental knowledge and skills necessary to properly install and maintain cable television equipment.

INDICATOR: The trainee demonstrates the ability to effectively install, repair, and perform routine maintenance functions on cable television systems.

BENCHMARK: The trainee demonstrates the ability to splice cable for drop cable "F" connectors by using a crimp tool to remove the proper amount of insulation to expose the necessary amount of center conductor for the "F" connector.

ASSESSMENT: Instructor indicates cable is correctly cut, "F" connector is crimped effectively, and connector can not be removed after installation.

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| COMPETENCY AREA: | ELECTRONICS - CABLE TELEVISION INSTALLATION |
| COMPETENCY STATEMENT: | The trainee has the fundamental knowledge and skills necessary to properly install and maintain cable television equipment. |
| INDICATOR: | The trainee demonstrates the ability to effectively install, repair, and perform routine maintenance functions on cable television systems. |
| BENCHMARK: | The trainee reads a cable TV map by locating CATV equipment terminals. |
| ASSESSMENT: | Instructor indicates satisfactory completion. |

## References

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